AMENDMENT

In the claims:

Amend claim 25, as follows:

25. (Amended) A method of producing a composition comprising a highly oxidatively stable polyalphaolefin and a diphenylamine antioxidant, comprising:

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hydrogenating polyalphaolefin to a level of hydrogenation in which an RBOT level of at least 2200 minutes is achieved; and

adding the diphenylamine antioxidant to the polyalphaolefin, to form the composition.

REMARKS

1. Status of claims

Claims 1-28 are pending.

2. Support for amendment

The above amendment addresses a rejection of claim 25 as being indefinite, as will be described in more detail under heading 3, below. A copy of the claim, with deletions and insertions indicated by brackets and underlining, respectively, is attached as an Appendix. No new matter is added by this amendment.

3. Claim rejections under 35 U.S.C. §112, second paragraph

Claim 25 is rejected under 35 U.S.C. §112, second paragraph, as being indefinite. Specifically, the Examiner states the claim, though directed to a composition comprising a highly

oxidatively stable polyalphaolefin and a diphenylamine antioxidant and reciting the formation of the highly oxidatively stable polyalphaolefin, does not recite the formation of the composition.

By the above amendment, claim 25 now recites the formation of the composition by adding the diphenylamine antioxidant to the polyalphaolefin. Applicants believe this amendment renders claim 25 definite, and the rejection should be withdrawn.

4. Claim rejections under 35 U.S.C. §102

Claims 13-24 are rejected under 35 U.S.C. §102(b) as being anticipated by Wu et al., U.S. Pat. No. 5,276,227 ("Wu"). Specifically, the Examiner alleges that Wu teaches a method of hydrogenating polyalphaolefin to a Bromine Number less than 4 (equivalent to a Bromine Index of 4000), which anticipates the present claims, which recite polyalphaolefins with a Bromine Index of less than 200. Applicants respectfully traverse this rejection.

Wu, as pointed out by Applicants in their response to the previous Office Action, discloses polyalphaolefins with a Bromine Number "usually lower than 4" (Wu, col. 3, lines 47-51), which would correspond to a Bromine Index usually lower than 4000. Wu does not expressly disclose a Bromine Index of 200 or less. The Examiner has no textual basis in Wu for concluding that Wu disclosed polyalphaolefins with a Bromine Index of 200 or less, and thus Applicants maintain that Wu does not teach polyalphaolefins with a Bromine Index of 200 or less and therefore cannot anticipate the present claims.

This is especially true in light of Applicants' teaching regarding the applicability of the Bromine Index method, ASTM D 2710, to quantify the unsaturation of polyalphaolefins. At p. 5, line 18-27, Applicants point out that the Bromine Index method was developed to quantify unsaturation of petroleum hydrocarbons such as cumenes. Polyalphaolefins have greater steric

hindrance to bromination than do petroleum hydrocarbons, and polyalphaolefins are limited in solubility in the test solvent (714 mL glacial acetic acid, 134 mL either 1,1,1-trichloroethane or dichloromethane, 134 mL methanol, and 18 mL 16.67 vol% H_2SO_4 in water per 1 L). Both these phenomena create problems with accuracy and repeatability. A copy of the Bromine Index method protocol, ASTM D 2710, is attached for the Examiner's convenience; the solvent is described at paragraph 7.3.6.

To overcome the problems with accuracy and repeatability found in using ASTM D 2710 with polyalphaolefins, Applicants modified the protocol as described at p. 6, lines 1-9. The modified protocol was designated K801 (p. 5, line 27).

Applicants then measured the Bromine Index of two polyalphaolefin samples by K801, as well as the oxidative stability of the samples, and compared the results with the Bromine Index measured by ASTM D 2710 and oxidative stability of a sample reported by Gunsel et al., *J. Soc. Tribol. Lubr. Eng.* 43(8):629-635 (1987) ("Gunsel"). At p. 6, lines 10-26, Applicants compare a moderately hydrogenated sample (K801 Bromine Index of 433) and a highly saturated sample (K801 Bromine Index of 0.95) with Gunsel's sample (D 2710 Bromine Index of 2). The oxidative stabilities of both of Applicants' samples were "significantly better" than that of Gunsel's sample (p. 6, lines 16-22).

Absent a teaching to the contrary, one of ordinary skill in the art would expect oxidative stability of a polyalphaolefin to correlate with the saturation of the polyalphaolefin. Therefore, because Applicants' samples both had significantly better oxidative stability than Gunsel's sample, one of ordinary skill in the art would conclude that Gunsel's sample was less saturated than either of Applicants' samples. From this conclusion, it is reasonably likely that Gunsel's sample's true Bromine Index, as measured by protocol K801, would be greater than 433.

In other words, Gunsel's sample had a stated Bromine Number of 0.002 (as measured by D 2710 and dividing by 1000), but the true value is most likely greater than 0.433. The Bromine Number assay, ASTM D 1159, would be expected to have the same complications as the Bromine Index assay, given that the polyalphaolefin sample would be the same regardless of the assay chosen, and the solvent is likewise the same (see ASTM D 1159, copy attached, paragraph 7.10). Therefore, it would be expected that the Bromine Number assay for polyalphaolefins, following the unmodified ASTM D 1159, would give an inaccurately low value.

As a result, even if, accepted strictly for the sake of argument, Wu's disclosure of a polyalphaolefin with a Bromine Number "usually lower than 4" could be construed as a disclosure of a polyalphaolefin with a Bromine Number of less than 0.2, one of ordinary skill in the art, in light of the present specification, would conclude that any such Bromine Number was measured according to an unmodified ASTM D 1159, and is thus inaccurately low. Given that Gunsel's sample's stated Bromine Number of 0.002 is likely, when more accurately measured, to be greater than 0.433, any polyalphaolefin disclosed by Wu to have a Bromine Number of less than 0.2 is also likely to have a Bromine Number greater than 0.433, i.e., a Bromine Index greater than 433, i.e., a Bromine Index outside of the claimed range.

In addition, ASTM D 1159 makes clear that Wu's Bromine Number of less than 4 cannot be construed as a teaching of Bromine Index values of less than 200. First, at paragraph 1.1.2, ASTM D 1159 states that the test method "is not satisfactory for normal alpha-olefins." Further, ASTM D 1159, at paragraph 1.3, states that Bromine Numbers of less than about 0.5 are unreliable and are better measured by a Bromine Index assay. Specifically, "If the bromine number is less than 0.5, than Test Method D 2710... *must* be used in accordance with [its] scope. The practice of using a factor of 1000 to convert bromine number to bromine index is not

applicable for these lower values of bromine number" (emphasis added). This further renders suspect any hypothetical disclosure by Wu of polyalphaolefins with a Bromine Index of 200 or less.

Therefore, Wu does not disclose every element of the present claims, and this rejection of claims 13-24 should be withdrawn.

5. Claim rejections under 35 U.S.C. §103

First, claims 1-8, 10-12, and 27 are rejected under 35 U.S.C. §103(a) as being unpatentable over Sauer, U.S. Pat. No. 3,113,167 ("Sauer"), in view of Wu. Specifically, the Examiner alleges Sauer teaches a process for the production of polyalphaolefins and Wu supplements Sauer by teaching polyalphaolefins with a Bromine Index of less than 200. Applicants respectfully traverse this rejection.

As discussed above, one of ordinary skill in the art cannot conclude that Wu discloses polyalphaolefins with a Bromine Index of less than 200. Therefore, the combination of Wu and Sauer neither teaches nor suggests a method of producing polyalphaolefins with a Bromine Index of less than 200. Further, regardless whether one of ordinary skill in the art would be motivated to hydrogenate to a low Bromine Index level, given the noted shortcomings of the ASTM D 2710 Bromine Index assay, there can be no expectation that hydrogenating a sample to the extent of saturation reported in the present specification would be performed. In order to save time, energy, and reagents, one of ordinary skill in the art, without the benefit of the present specification, would be expected to hydrogenate only to a low Bromine Index level as measured by the known ASTM D 2710 assay. Claims 1-8, 10-12, and 27 are therefore patentable over this combination of references. Applicants request the rejection be withdrawn.

Second, claims 1-4, 6-12, 26, and 28 are rejected under 35 U.S.C. §103(a) as being unpatentable over Cupples, U.S. Pat. No. 4,282,392 ("Cupples"), in view of Wu. Specifically, the Examiner alleges Cupples teaches a process for the production of alphaolefin oligomers and Wu supplements Cupples by teaching polyalphaolefins with a Bromine Index of less than 200. Applicants respectfully traverse this rejection.

As discussed above, one of ordinary skill in the art cannot conclude that Wu discloses polyalphaolefins with a Bromine Index of less than 200. Therefore, the combination of Wu and Cupples neither teaches nor suggests a method of producing polyalphaolefins with a Bromine Index of less than 200. Further, regardless whether one of ordinary skill in the art would be motivated to hydrogenate to a low Bromine Index level, given the noted shortcomings of the ASTM D 2710 Bromine Index assay, there can be no expectation that hydrogenating a sample to the extent of saturation reported in the present specification would be performed. In order to save time, energy, and reagents, one of ordinary skill in the art, without the benefit of the present specification, would be expected to hydrogenate only to a low Bromine Index level as measured by the known ASTM D 2710 assay. Claims 1-4, 6-12, 26, and 28 are therefore patentable over this combination of references. Applicants request the rejection be withdrawn.

Third, claim 25 is rejected under 35 U.S.C. §103(a) as being unpatentable over Cupples in view of Wu or Sauer in view of Wu, further in view of Van Dyck Fear, U.S. Pat. No. 2,980,603 ("Fear"). Specifically, the Examiner alleges Fear supplements Cupples and Wu or Sauer and Wu by teaching the use of diphenylamine as a known antioxidant additive. Applicants respectfully traverse this rejection.

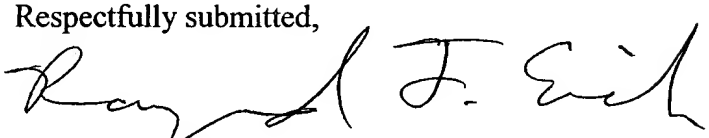
As discussed above, the combinations of Cupples and Wu or Sauer and Wu neither teach nor suggest a method of producing polyalphaolefins with a Bromine Index of less than 200.

Further, regardless whether one of ordinary skill in the art would be motivated to hydrogenate to a low Bromine Index level, given the noted shortcomings of the ASTM D 2710 Bromine Index assay, there can be no expectation that hydrogenating a sample to the extent of saturation reported in the present specification would be performed. In order to save time, energy, and reagents, one of ordinary skill in the art, without the benefit of the present specification, would be expected to hydrogenate only to a low Bromine Index level as measured by the known ASTM D 2710 assay. Given these observations, whether Fear teaches the use of diphenylamine antioxidants is moot, and claim 25 is therefore patentable over this combination of references. Applicants request the rejection be withdrawn.

6. Conclusion

In conclusion, Applicants believe all pending claims 1-28 are in condition for allowance. The Examiner is invited to contact the undersigned patent agent at (713) 934-4065 with any questions, comments or suggestions relating to the referenced patent application.

Respectfully submitted,



Raymund F. Eich
Reg. No. 42,508

AGENT FOR APPLICANTS

WILLIAMS, MORGAN & AMERSON, P.C.
7676 Hillmont, Suite 250
Houston, Texas 77040
(713) 934-4065
(713) 934-7011 (fax)

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Appendix
Amended Claims

25. (Amended) A method of producing a composition comprising a highly oxidatively stable polyalphaolefin and a diphenylamine antioxidant, comprising [the step of] :

hydrogenating polyalphaolefin to a level of hydrogenation in which an RBOT level of at least 2200 minutes is achieved; and

adding a diphenylamine antioxidant to the polyalphaolefin, to form the composition.